98-319h-0

ALTERNATIVE STOCK WATERING SYSTEMS

FINAL REPORT

A WATER QUALITY/QUANTITY IMPROVEMENT PROGRAM

SUBMITTED TO:

US FISH AND WILDLIFE SERVICE

ID # 319h-V-01

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ABSTRACT:

The Scott River Watershed has been listed as an impaired water body by the North Coast Regional Water Quality Control Board (NCRWQCB). The listed water quality impairments of the Scott River are excessive water temperature and high sediment levels. The Siskiyou Resource Conservation District (RCD) believes the two impairments adversely effect each other. Some of the Scott River watersheds high water temperatures are derived from excessive sediment contribution. Stream systems which have excessive sediment levels are characterized by having wide, unstable channels, braided channels, channels possessing poor width/depth ratios and channel aggradation. These are the same factors which make a stream susceptible to increased water temperatures.

So where do we start when attempting improve water quality? Most feel a reduction in water temperature is more important and should be the first impairment to correct. The RCD has come to realize that the source of temperature increase is caused largely by the symptoms of excessive bed load. The upland property owners and managers, the Siskiyou RCD and Scott River CRMP are already collectively working to reduce upslope sediment sources and have changed many methods of operation in recent times. In addition, harvesting regulations as well as road construction specifications and design have limited the potential sources of sediment contribution. The upslope interests are identifying the remaining sources and are attempting to correct them. The solution to the excessive bed load already in the stream systems has not been dealt with at this point and must be considered as it will take decades or centuries to pass through the watershed.

Due to the size of the project budget and consideration of the cost/benefit ratio, the RCD decided to focus on eliminating factors which impact both water quality impairments. The RCD considered focusing on riparian planting to provide shade and reduce the width of the active channel and trap sediment but felt a single focus was not going to significantly improve a stream reach. In order to provide immediate improvement to a specific stream reach, the RCD constructed riparian fencing, installed a water efficient livestock watering system and planted riparian trees within a reach of Mill Creek and Shackleford Creek near their confluence. The goal of the multi-discipline project was to increase flows, protect riparian area, and provide riparian cover to trap sediment already in the stream.

Development of KRIS was also a goal of the RCD. The KRIS system has been used by the RCD to log and utilize data and display accomplishments.

BACKGROUND:

The Siskiyou Resource Conservation District (RCD) is a special district ran by a board of property owners who are addressing the issues related to resource use within the Scott River Watershed. The RCD has focused mainly on the floor of Scott Valley which has been dominated by agricultural use for over a century. Agriculture within Scott Valley focuses on beef cattle, wheat and alfalfa production. The Siskiyou RCD searches for project designs which conserve the use of resources as well as improve management of property and livestock. We have found that projects which serve mutual benefits or, at least no negative impacts to the property owner are permanent projects as the property owner is eager to take over the required maintenance.

The current issue related to resource use revolves around anadromous fisheries and watershed health. The population of anadromous fisheries has generally declined throughout the Pacific Northwest during the past several decades. Academia has found that water quality is one of the limiting inland factors related to declining salmonid populations. The North Coast Regional Water Quality Control Board (NCRWQCB) has listed the Scott River has having two non-point source water quality impairments: excessive sediment and temperature levels at certain periods of the year. The NCRWQCB feels that insufficient surface flows (partly due to excessive bed load) have been one of the factors leading to high water temperatures during the late summer and early fall. Increased fall flows is a major goal of the Scott River Coordinated Resource Management Plan (CRMP) and the RCD.

Alternative Livestock Watering Systems

Restoration projects within the floor of Scott Valley include riparian fencing, bank stabilization, implementation of fishery habitat improvement structures, replanting the riparian zone, and improving water use efficiency. This "holistic" approach includes practices which reduce high sediment levels and water temperatures within streams used by anadromous fish. It does not, however identify an alternative "off-site" (outside of the stream corridor and riparian zone) source for watering livestock which previously utilized surface flow from a stream or diversion ditch from a stream.

The lack of alternate watering sources looked to be the limiting factor which would reduce the scope of a holistic restoration approach throughout the watershed. If the RCD could provide an off-site watering source, many property owners who own livestock would agree to management changes within riparian zones and/or use water efficient stock watering strategies on their property. Because only "indirect" benefits are gained by installing off-site watering systems, fisheries improvement funding sources have not been interested in funding such projects.

The practice of developing an off-site watering system has been termed the Alternative Livestock Watering System (ALWS) by the RCD and the Scott River CRMP. The ALWS is now the catalyst for development of new restoration programs. A livestock watering

system which meets the landowners management needs is a permanent solution to excluding or intensively managing cattle within riparian zones and increasing surface flow by reducing the need for diverting water. The increase in flows allows adult chinook to access and utilize the prime spawning and rearing areas located in the upper portion of Scott Valley (Horn Lane to French Creek).

A typical alternative livestock watering system is designed and installed during the winter when stock water is plentiful and no irrigation will be taking place. The projects are designed to gain the maximum benefit for the least cost. A typical stock water system uses an existing well as its source of ground water. A small submersible pump is installed in the well casing. The pump size ranges from 3/4 to 1 1/2 horsepower depending on the number of troughs, the distance between pump and troughs and whether or not the system will double as a riparian revegetation irrigation system. The submersible pump is accompanied by a large pressure tank, pressure switch and a pressure sensor. The system is similar in design system installed in homes. The pump system is inside an insulated pump house with a concrete foundation.

Water is transported by through schedule 40 PVC pipe ranging in size from 3/4" to 1 1/2" in diameter. Pipe diameter is determined by a sliding scale which takes increase in elevation, length of run and desired flow volume at source into account. Friction draw-down inside the pipe is a major loss of pressure and flow volume over a long distance. The desired diameter of pipe is buried 24"-30" deep in the soil.

Troughs are also supplied by the RCD. The number of troughs and size depends on the number of livestock using the system and the management style related to cost/ benefit. The flow to the troughs is activated by a float valve which conserves water and power by eliminating the need for continuous flow.

The RCD installed a ALWS at the confluence of Mill and Shackleford Creek. The system allowed the RCD to seek another grant to install in-stream structures and provide some riparian fencing along Mill Creek and Shackleford Creek. The additional grant supplemented the fencing installed within this contract and extended the riparian area protected by fencing. The Quartz Valley project also eliminated the need for surface water to be diverted to livestock by replacing the effectiveness of a diversion ditch for livestock watering purposes (approx. 2.0 cfs from Mill Ck.).

In sum, roughly 160 head of cattle will be intensively managed within the riparian area rather then year round access to the stream and year round operation of the diversion ditch. Approximately 2.0 cfs will not be diverted from Mill Creek this fall due to the ALWS. An additional 2.5 cfs will also remain in the stream due to another ALWS that was installed in 1997. The combination will make a significant difference in the flow volume of Mill Creek. However, in order to ensure adult salmonids access to Mill/Shackleford Creeks more ALWS need to be installed in the lower reaches of Shackleford Creek and the Delta at the Bottom of Shackleford Creek needs to be removed annually.

Fencing

The Project is one of improved agricultural management and protection of the riparian area in order to improve in-stream conditions on Mill and Shackleford Creek. The riparian area was in stable condition but is beginning to degrade as only mature riparian trees remain. Natural regeneration has been limited by excessive grazing. Riparian fencing was proposed for the area to eliminate future damage caused by livestock and allow natural revegetation to occur.

The RCD felt riparian fencing would provide sufficient riparian restoration due to the stable, high water table and sufficient riparian seed source. Only several locations were selected for riparian planting due to their higher setting on a terrace. Properly functioning riparian areas trap sediment being transported as bed load, hold sediment, stabilize banks, provide shade and cover for fish as well as in-stream complexity. In order to improve the in-stream habitat within the scope of the project reach, the riparian area needed to be allowed to regenerate. Outside of the project scope, upland sediment contribution needed to be limited in order to eliminate a significant part of the sediment source. The RCD currently has two upland projects focusing on limiting sediment contribution. The major upland property owner, Fruit Growers Supply Co., is improving road systems and putting some roads to bed. The combination of limiting upland sediment sources in conjunction with protecting riparian corridors will work toward improved in-stream conditions for salmonids and improved water quality.

Approximately 4 miles of Riparian Fencing has been installed on both Mill Creek and Shackleford Creek. The funding has come from three sources and has been combined to create a contiguous reach. The area extends from the confluence of Emigrant Creek and Mill Creek to the confluence of Mill and Shackleford Creek. It also encompasses a .8 mile reach of Shackleford Creek. The fencing meets NRCS fencing specifications and allows for a wide riparian area. The riparian area ranges in width from 180 feet to over 400 feet.

The fence has five wires, post spacing of 12 and 16 feet and railroad ties are used as the structural wooden posts. Approximately 4,100 feet (some funding was shifted to riparian planting) of fence was constructed with the project funding. This is less then the intended amount of 6,400 feet which was originally intended for a reach on the Scott River. The property on the Scott River has been for sale and the RCD decided to wait until the property was bought and determine if the new ownership was committed to the project. We also felt that focusing on one reach with several disciplines would produce better recovery.

A wide riparian area (180-400+ feet) was established with the understanding that limited grazing could occur within the reach but must be controlled. Within one year the riparian species have exploded within the fenced area. In addition, livestock feed has also increased within the riparian area. The property owners are diligent about grazing

assessment, livestock removal timing, and understand the importance of riparian systems. The cooperation of the property owners is excellent as the riparian area remains viable to their operation and the goal of riparian is mutual.

Riparian Planting

The establishment of the riparian fencing provided a safe area to plant riparian species as well. Although riparian planting was not the focus of the project, areas where natural regeneration appeared difficult were planted. Species used included Pacific Willow, Arroyo Willow and Black Cottonwood. The areas which were planted were higher elevation areas (terraces) which possessed poor soil conditions. Approximately one acre was planted to riparian trees.

The planting style used large cuttings of willow species and cottonwood. The RCD began planting pole stock during the spring of 1996. Since then we have planted over 60 acres of pole stock throughout the watershed. The method is rather severe initially, but the results have been very good. The RCD cuts large rooted stock from willow species (Pacific Willow and Arroyo Willow) and from Black Cottonwood. The cuttings are usually no more then 2.5" in diameter yet may be as long as 12 feet. The cuttings are transported to the site, placed in a deep trench and buried using a back hoe. The RCD uses a back-hoe in order to place the cuttings at an elevation deep enough to be in contact with the summer water table. On average the cuttings were placed in a trench 4'-6' deep. The sites were selected because they are locations which were too harsh for natural propagation.

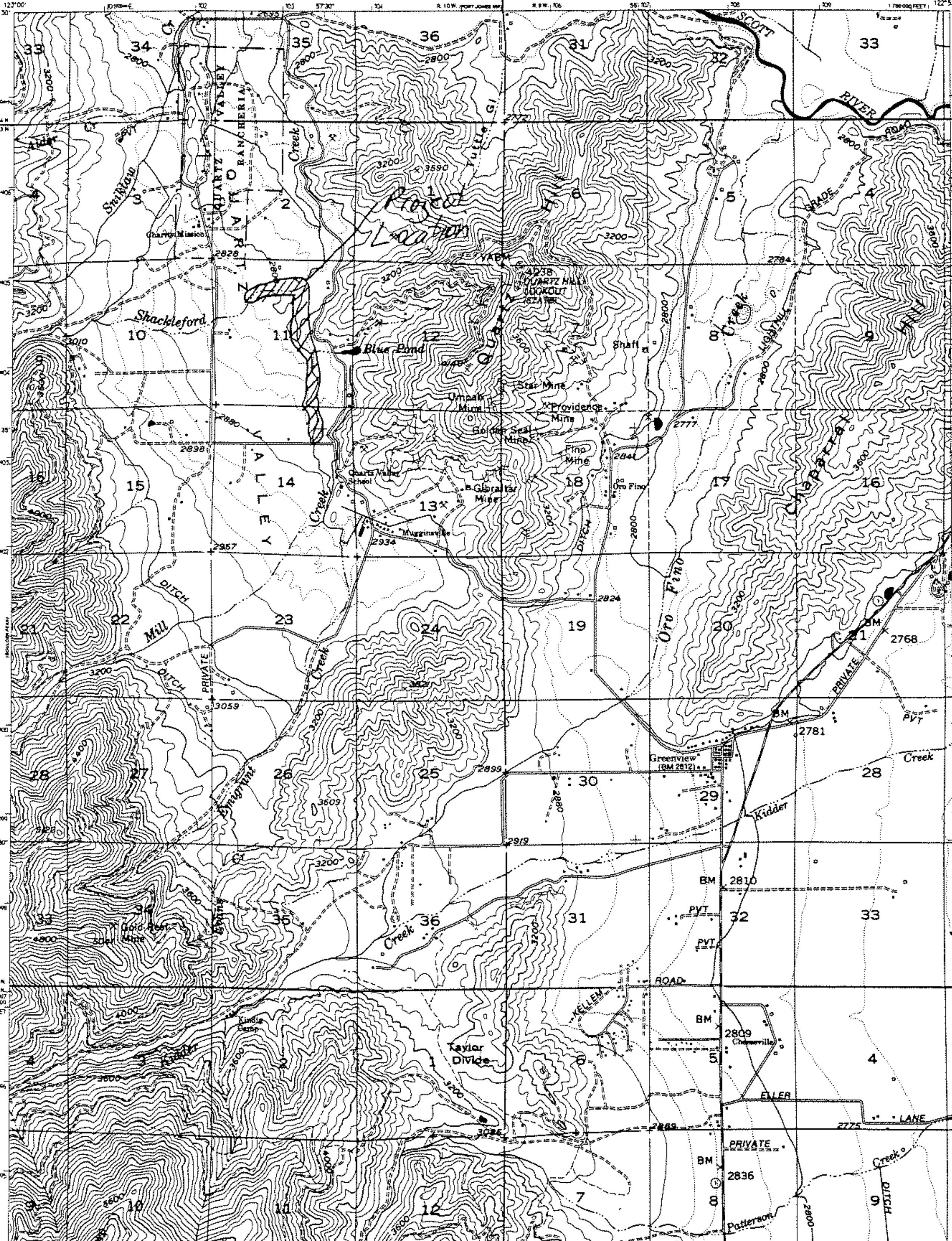
The pole stock has completed it first year of growth. There are trees over three feet tall with the average being about two feet tall with 6-8 branches. At this point, the riparian plantings in combination with natural propagation have increased the number of riparian tress ten fold. The trees are emerging above the annual plants and can be seen throughout the riparian area. It is very exciting to walk the project area and see the positive change for toward water quality improvement and agricultural management. We are defiantly on the right track.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

R.10W

FORT JONES SW QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES

T44N
T43N



Base map prepared by the U.S. Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1951. Field check 1954

Polyconic projection 1927 North American datum
10,000-foot grid based on California coordinate system, zone 1
1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

INTERIM EDITION

Modification to USGS base map prepared by the Geometronics Service Center from 1982 aerial photography and 1983 correction guides furnished by the Pacific Southwest Region.

Landnet revised according to additional Forest Service evidence.

UTM GRID AND 1984 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

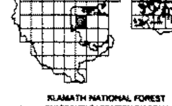
LEGEND

National Forest Boundary
Alienated Land within the National Forest Boundary

TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Locked Gate
Road, Location Approximate

U.S. Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Trail
Trail, Location Approximate



KLAMATH NATIONAL FOREST
QUADRANGLE LOCATION DIAGRAM

FORT JONES SW, CALIF.
N4130-W12252.5/7.5
REVISED 1983

718-3C

KRIS Development

Task 2.1

The Siskiyou RCD and Scott River CRMP received funding for Etna Union High School District Watershed Education. This funding allowed the two high schools in Scott Valley to operate independent of the County Office funding. Therefore, our data collection efforts were coordinated directly with local high schools and not with the County Schools office. Sue Maurer was the Education Coordinator for school year 1998/1999. Temperature data was added to the KRIS system as topics with charts. Temperature, cross sections, and sediment sampling monitoring sites were added to KRIS map using ArcView. This local information will be available to all KRIS users after the system is updated.

A watershed education topic will be added that contains photos and captions describing the schools' monitoring elements of 1998/1999.

Task 2.4

Five new users have been shown the utility of KRIS: one RCD staff; two NRCS staff; an Americorp volunteer; and an instructor from Scott River High School. Three of these contacts were shown KRIS by RCD staff. The other two contacts attended a session that Pat Higgins from Kier and Associates provided at the RCD office. Mr. Higgins provided a general overview of the new alpha version of KRIS for Windows 95. He also worked with RCD and CRMP staff to correct existing topics, develop new topics, and update the Scott River ArcView project.

Task 2.5

The following recommendations are provided based on using KRIS to build topics, and comments received from new users:

* The best way KRIS can be improved is to provide a list server for all users of KRIS. This listserv will have to include help for ArcView also since KRIS map is a part of KRIS. If a listserv is not possible, then a bulletin board to post questions and comments.
* KRIS is buggy. Fix the bugs before widely distributing the software. Also, periodically provide users with a list of known or potential bugs. Better yet, post this information on the KRIS webpage with patches, fixes, or workarounds. Provide product support online.
* The tutorials need to be improved. Most of the tutorials are good; however, the tutorial on how to build tables does not include a section of troubleshooting. The cell formats that KRIS will accept are rigid. The tutorial does not

recognize this or provide help on how to change a format. A non-KRIS user should help develop the tutorials and help section.

* KRIS needs more and better documentation. There is no KRIS manual. The tutorials are there but the information seems scattered. Some info is in the ReadMe file, some in the help section, some is only available from skilled users. A video on the basics of KRIS would be useful.
* The user skills necessary for the full use of the GIS and updating functions of KRIS need to be better defined. KRIS can be a powerful management tool or a browsing software based on the user's GIS and computer skills.
* The distinction between KRIS map and KRIS db needs to be clarified. One potential cooperator assumed that the maps and ArcView are provided with KRIS based on a presentation he received on KRIS's utility. One flyer about KRIS states that "KRIS is GIS and more". That is misleading. A statement should be added that ArcView needs to be purchased separately and GIS skills are desirable for use of KRIS map.
* The resources necessary to use KRIS needs to be better presented for potential cooperators. These resources include: real not minimal computer requirements; user skill; dedicated staff time; system maintenance time; training time; and support of KRIS within the user's establishment. Failure to consider and provide these resources result in KRIS not being used due to lack of time, lack of money, and general frustration with the software.